

REMARKS

Title

Applicant submits herewith an amended Title of the Invention that is more indicative of the invention to which the claims are directed.

Claim Rejections 35 U.S.C. § 112, second paragraph

The Examiner has rejected claims 31-39 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the Examiner's opinion, the term "thin first/second/third spacers" and "thick fourth spacers" in claims 31 and 35-38 is a relative term which renders the claim indefinite. It is further the Examiner's opinion that the terms "thin spacers" and "thick spacers" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Applicant respectfully disagrees with the Examiner. The claims of the Applicant's claimed invention are to be read in light of the specification. The specification clearly provides the following standards for "thin" and "thick":

In one embodiment, the thin first spacer (630) has a thickness in the range of approximately 50-150 Angstroms. See lines 32-33 on page 15 of the specification. See Figure 6B.

In one embodiment, the thin second spacer (640) has a thickness in the range of approximately 50-150 Angstroms. See lines 7-8 on page 16 of the specification. See Figure 6C.

In one embodiment, the thin third spacer (650) has a thickness in the range of approximately 50-300 Angstroms. See lines 27-28 on page 16 of the specification. See Figure 6F.

In one embodiment, the thick fourth spacer ((660) has a thickness in the range of approximately 300-2000 Angstroms. See lines 34-35 on page 16 of the specification. See Figure 6G.

The Examiner has rejected claims 31-39 under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.

In the Examiner's opinion, the omitted structural cooperative relationships are: the structural relationship between the recessed spacers and other features of the device. The Examiner states that the requirements of the spacers being recessed is incomplete without knowing what other features the spacers are recessed with respect to.

Applicant respectfully disagrees with the Examiner. The claims of the Applicant's claimed invention are to be read in light of the specification. The specification clearly provides the following standards for "recessed":

In one embodiment, the thick fourth spacer (660) is recessed approximately 60 nanometers deeper than the surface level of the gate layer (620). See lines 14-16 on page 17 of the specification. See Figure 6I.

The thin third spacer (650) is recessed to approximately the same depth as the thick fourth spacer (660). See Figure 6J.

The thin second spacer (640) is recessed to approximately the same depth as the thin third spacer (650). See Figure 6L.

The thin first spacer (630) is recessed approximately 60 nanometers deeper than the surface level of the gate layer (620). See lines 15-16 on page 18 of the specification. See Figure 6M.

In view of the foregoing, Applicant requests the Examiner to withdraw the rejection to claims 31-39 under 35 U.S.C. § 112, second paragraph.

Claim Rejections 35 U.S.C. § 103 (a)

The Examiner has rejected claims 31-39 under 35 U.S.C. §103 (a) as being unpatentable over Fulford, Jr. et al. (US 5,847,428) in view of Chen-Hua (US 6,191,462).

It is the Examiner's opinion that, with regard to claim 31, Fulford, Jr. et al. teaches a gate electrode, comprising:

- an insulative layer (Col. 7, lines 57-58);
- a gate layer (114) on the insulative layer;
- first spacers (128) on opposing sides of the gate;
- second spacers (136) adjacent the first spacers;
- third spacers (148) adjacent the second spacers; and
- fourth spacers (160) adjacent the third spacers.

The Examiner concedes that Fulford Jr. et al. does not teach a conductive layer. See Figure 12. Thus, the gate electrode of Fulford Jr. et al. differs from the gate electrode of Applicant. However, the Examiner states that Chen-Hua teaches a gate electrode with a conductive layer (10) on the gate layer (4) so, in the Examiner's opinion, it would have been obvious to one of ordinary skill in the art to incorporate the conductive layer taught by Chen-Hua into the device taught by Fulford, Jr. et al. See figure 4.

Applicant respectfully disagrees with the Examiner. Even if the conductive layer of Chen-Hua were to be incorporated into the gate electrode of Fulford, Jr. et al., the resulting device would not be the same as the gate electrode of Applicant since the conductive layer (690) in the gate electrode of Applicant extends beyond edges of the gate layer (620). See lines 31-32 on page 18 of the specification. See Figure 6P. In contrast, the conductive layer (10) in the gate electrode of Chen-Hua does not extend beyond edges of the gate layer (4). See Figure 4.

The Examiner also concedes that Fulford, Jr. et al. does not explicitly teach recessed spacers. Thus, the gate electrode of Fulford, Jr. et al. differs from the gate electrode of Applicant. However, the Examiner states that Chen-Hua teaches insulative layers (6, 8) above the gate layer (4).

Applicant disagrees respectfully with the Examiner. Even if the insulative layers of Chen-Hua were to be incorporated into the gate electrode of Fulford Jr., et al., the resulting devices would not be the same as the gate electrode of Applicant since the insulative layers (630, 640, 650, 660) of Applicant are recessed to lower surface of the conductive layer (690). See Figure 6P. In contrast, the insulative layers (6, 8) of Chen-Hua are higher than the lower surface of the conductive layer (10). See Figure 4.

Consequently, the combination of the gate electrode of Fulford Jr. et al. and the gate electrode of Chen-Hua will not produce the gate electrode of Applicant. In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 31-39, as amended, under 35 U.S.C. §103 (a).

Applicant believes that all claims pending are now in condition for allowance so such action is earnestly solicited at the earliest possible date.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

31. (Once Amended) A gate electrode [formed on a substrate] comprising:

an insulative layer disposed [formed] on a substrate;

a gate layer disposed [formed] on said [the] insulative layer;

a conductive layer disposed [formed] on said [the] gate layer, said conductive layer extending beyond edges of said gate layer;

thin first spacers disposed [formed] adjacent to opposite sides of said [the] gate layer wherein said [the] thin first spacers are recessed to lower surface of said conductive layer;

thin second spacers disposed [formed] adjacent to opposite sides of said [the] thin first spacers wherein said [the] thin second spacers are recessed to lower surface of said conductive layer;

thin third spacers disposed [formed] adjacent to opposite sides of said [the] thin second spacers wherein said [the] thin third spacers are recessed to lower surface of said conductive layer; and,

thick fourth spacers disposed [formed] adjacent to opposite sides of said [the] thin third spacers wherein said [the] thick fourth spacers are recessed to lower surface of said conductive layer.

32. (Once Amended) The gate electrode of claim 31 wherein said [the] insulative layer comprises [is] an oxide.

33. (Once Amended) The gate electrode of claim 32 wherein said [the] gate layer comprises [is] a polysilicon.

34. (Once Amended) The gate electrode of claim 33 wherein said [the] conductive layer comprises [is] a polycide.

35. (Once Amended) The gate electrode of claim 34 wherein said [the] thin first spacers comprise [are] an oxide.

36. (Once Amended) The gate electrode of claim 35 wherein said [the] thin second spacers comprise [are] a nitride.

37. (Once Amended) The gate electrode of claim 36 wherein said [the] thin third spacers comprise [are] an oxide.

38. (Once Amended) The gate electrode of claim 37 wherein said [the] thick fourth spacers comprise [are] a nitride.

39. (Once Amended) The gate electrode of claim 38 wherein said [the] polycide comprises [is] titanium salicide ($TiSi_2$).